What is claimed is:

1. A separation system comprising:

a distillation column into which a mixture of a first component mainly comprising water and a second component mainly comprising nonaqueous substances is supplied;

a separator including a separation membrane for separating overhead vapor discharged from a top of said distillation column into a permeable vapor which mainly comprises said first component and a nonpermeable vapor which mainly comprises said second component by allowing only a selected portion of said overhead vapor to permeate said separation membrane; and

a reflux unit for cooling a portion of said overhead vapor into a liquid and returning the liquid thus obtained into an upper portion of said distillation column.

2. The separation system of claim 1 wherein said distillation column includes fluidized beds.

3. A separation system comprising:

a distillation column into which a mixture of a first component mainly comprising water and a second component mainly comprising nonaqueous substances is supplied;

a first separator including a first separation membrane for separating overhead vapor discharged from a top of said distillation column into a first permeable vapor which mainly comprises said first component and a first nonpermeable vapor which mainly comprises said second

component by allowing only a selected portion of said overhead vapor to permeate said first separation membrane; and

a second separator including a second separation membrane for separating said first permeable vapor into a second permeable vapor which mainly comprises said first component and is higher in the concentration of said first component than said first permeable vapor, and a second nonpermeable vapor which mainly comprises said second component, by allowing only a selected portion of said first permeable vapor to permeate said second separation membrane.

4. A reactor system comprising:

a reactor for producing an aromatic carboxylic acid and water from an alkyl aromatic compound in a solvent containing acetic acid, and for generating a vapor mixture of a solvent and water;

a first separation membrane for separating said vapor mixture, which is discharged from said reactor, into a first permeable vapor mainly comprising a first component and a first nonpermeable vapor mainly comprising a second component;

a second separation membrane for separating said first permeable vapor, which is discharged from said first separation membrane, into a second permeable vapor mainly comprising the first component and a second nonpermeable vapor mainly comprising the second component; and

a return passage for condensing said first nonpermeable vapor and said second nonpermeable vapor and returning the thus condensed first and second nonpermeable vapor into said reactor.

5. The reaction system of claim 4 wherein said solvent containing

acetic acid is acetic acid, said alkyl aromatic compound is paraxylene, and said aromatic carboxylic acid is terephthalic acid.

6. The reactor of claim 4 or 5 further comprising gas-liquid separators each provided between one of said first and second separation membranes and said return passage for separating terephthalic acid from said first and second nonpermeable vapors.

7. The reactor of any of claims 1-6 wherein said separation membrane or said first and second separation membranes comprise an inorganic porous member carrying in pores thereof a silica gel obtained by hydrolyzing an alkoxysilane containing ethoxy groups or methoxy groups.

8. A method of producing an aromatic carboxylic acid comprising an oxidation reaction step in which an alkyl aromatic compound is subjected to liquid-phase oxidation reaction using an oxygen-containing gas in a solvent containing acetic acid in the presence of an oxidation catalyst to produce a slurry of said aromatic carboxylic acid; a solid-liquid separation step in which said slurry is separated into a reaction mother liquid and an aromatic carboxylic acid cake; and

a step of separating at least a portion of a mixture of acetic acid and water produced during said steps into a permeable gas mainly comprising water and nonpermeable substances mainly comprising acetic acid by use of a separation membrane having selectivity for water.

9. The method of producing an aromatic carboxylic acid of claim 8 wherein at least a portion of the mixture fed to said separation membrane

is a gas.

10. The method of producing an aromatic carboxylic acid of claim 8 or 9 wherein said mixture of acetic acid and water further contains methyl acetate, and wherein using said separator having selectivity for water, at least a portion of said mixture is separated into said permeable gas, which mainly comporises water, and said nonpermeable substances, which mainly comprises acetic acid and further containing methyl acetate as another main component.

11. The method of producing an aromatic carboxylic acid of claim 10 wherein said mixture is produced in said oxidation reaction step, wherein using said separation membrane having selectivity for water, at least a portion of said mixture is separated into said permeable gas, which mainly comprises water, and said nonpermeable substances, which mainly comprises acetic acid and methyl acetate, and wherein said nonpermeable substances are at least partially returned to said oxidation reaction step.

12. The method of producing an aromatic carboxylic acid of claim 10 wherein at least a portion of a mix of acetic acid, a methyl acetate as a byproduct, and water, said mix being produced in a production process, is supplied into a distillation column, wherein at least a portion of the acetate in said mix is recovered from a bottom of said distillation column, wherein at least a portion of said mix is produced from a top of said distillation column as said mixture containing acetic acid, methyl acetate and water, wherein using said separation membrane having selectivity for water, at least a portion of said mixture is separated into said permeable gas, which

mainly comprises water, and said nonpermeable substances, which mainly comprises acetic acid and methyl acetate.

13. The method of producing an aromatic carboxylic acid of claim 12 wherein a portion of said mixture produced from the top of said distillation column is returned to said distillation column, and the remainder of said mixture is separated, using said separation membrane having selectivity for water, into said permeable gas, which mainly comprises water, and said nonpermeable substances, which mainly comprises acetic acid and methyl acetate.

14. The method of producing an aromatic carboxylic acid of claim 12 or 13 wherein said nonpermeable substances are returned to said oxidation reaction step.

15. The method of producing an aromatic carboxylic acid of any of claims 8-14 wherein using a separation membrane having selectivity for water, said permeable gas, which mainly comprises water, is further separated into a permeable gas mainly comprising water and nonpermeable substances mainly comprising acetic acid.

16. The method of producing an aromatic carboxylic acid of any of claim 15, wherein one of said separation membranes that is provided upstream from the other is one that is higher in the permeating speed, and the other is one that is higher in the separation ability.

17. The method of producing an aromatic carboxylic acid of any of

claims 8-16 wherein said separation membrane or said separation membranes are made of an inorganic material.

18. The method of producing an aromatic carboxylic acid of claim 17 wherein said separation membrane or said separation membranes comprise an inorganic porous member carrying in pores thereof a silica gel obtained by hydrolyzing an alkoxysilane containing ethoxy groups or methoxy groups.

19. The method of producing an aromatic carboxylic acid of any of claims 8-18 wherein said alkyl aromatic compound is paraxylene, and said aromatic carboxylic acid is terephthalic acid.